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THE GENUS *LYCAEIDES* IN THE PACIFIC NORTHWEST

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A CRITICAL AND THOROUGH REVISION of the North American forms of the genus *Lycaeides* Hubner was published by Nabokov (1949). The published names of the species and subspecies in the genus were clarified and the basic distribution of the different forms was presented. In this paper, he mentioned the lack of information on species from the Pacific coast, especially north of California. It is the purpose here to provide additional information on the distribution of the species of *Lycaeides* in this area and to present the possible means of the formation and origin of subspecies of *Lycaeides* in the Pacific Northwest. The territory included in this study covers Oregon, Washington, Idaho, southern British Columbia and western Montana. The author looked at and identified the specimens in every major Pacific Northwest collection of butterflies, with the exception of the collection at the University of Idaho.

The genus *Lycaeides* is composed of three species. Two of these are found in the Pacific Northwest. The species *L. argyrognomon* Bergstrasser is found in the mountainous and forested areas; being distributed from approximately 3000 feet to above timberline. *L. melissa* Edwards is a lowland form, occurring in the Great Basin and Columbia Plateau east of the Cascade mountains and is found from 300 to about 3000 feet. *Melissa* is most commonly associated with deciduous forests and the ponderosa pine plant associations (figure 2).

The male genitalia was used to separate *argyrognomon* from *melissa*. Nabokov (1949) showed that this was the best method for distinguishing specimens of heavily marked *argyrognomon* from the normally heavily marked *melissa*. Measurements of the genitalia were not made because of a lack of long series from any one area. Nabokov (1949) attempted this in an effort to separate different subspecies. But as was pointed out by Brown (1950a,b), the measurements were not statistically valid and thus not pertinent for separation of subspecies.

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The initials after the names are used with the locality data to indicate in which collection the individual specimen can be found. In addition, the abbreviations (Nab) and (BVL) were used to indicate the records of distribution published by V. Nabokov and Ben V. Leighton. It should be noted here that B. V. Leighton's "Butterflies of Washington" (1946) has been much criticized. The author does not feel that these criticisms are justified, as it is more reliable than any other published list of the butterflies of the Pacific Northwest. The above published records were included here when the author did not personally see material from the specific localities. Since this paper attempts to clarify the distribution of the *Lycaeides* in the Pacific Northwest, every available and reliable locality record was used.

Lycaeides argyrognomon ricei (Cross) *Plebeius scudderii* ssp. *ricei* Cross, 1937, Pan-Pacific Ent., 13:88.

Lycaeides argyrognomon ricei occurs in the Cascade mountains from Crater Lake, Oregon to the Hope Mts. of British Columbia (Table 1). At the southern end of its range it blends into the Sierra Nevada subspecies *L. a. anna* Edwards. The mountainous area in Oregon from Crater Lake to Mt. Shasta, Calif. is the area of intergradation of *anna* & *ricei*. In subspecies *anna* the underwings are chalk white with distinct black markings, whereas *ricei* is characterized by pale chalk-white ground on the undersides of the wings and by very light black marking on the underwing (fig. 1, nos. 14 & 15). The populations south of Crater Lake have individuals with both characteristics. The Lakeview specimen is an example of this (fig. 1, no. 13).

It would be easy to dismiss this problem by labeling the specimens *L. a. anna* near *ricei*, however specimens of *ricei* from Blue Slide, Washington, Paulina Lake and Gilchrist, Oregon (fig. 1, nos. 10, 11, 12) also show the heavier marked underside characteristic of *anna*. These specimens (fig. 1, nos. 10, 11, 12) come from isolated populations along the eastern edge of the Cascade mountain system. The climate there is different from that of the central Cascades. The summers are longer, hotter and drier. The sun shines almost constantly with little summer precipitation. This is in contrast to the weather of the central Cascades. Here rain, thunder and snow storms are not uncommon, even in July. The Cascade mountains of southern Oregon are broken and the dry eastern weather reaches further west to Medford. Thus several questions are raised. One, are

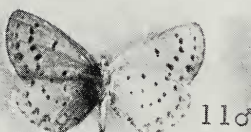
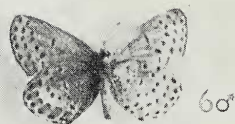
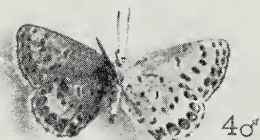
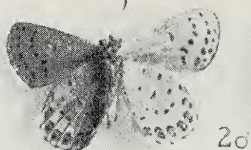
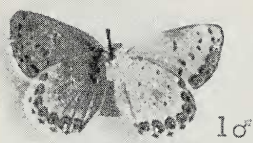
specimens from the drier eastern edge of the Cascades reacting phenotypically to the environment or are these populations just isolated local races? If they are reacting to the environment then are the populations from southern Oregon also examples of this or do they represent an intergradation with the California *anna*? This is a problem not immediately answerable. The author suggests that for convenience all western Oregon *argyrognomon* be referred to as *ricei* and all California *argyrognomon* from the northern part of the state be referred to as *anna*.

At the northern extent of its range, *ricei* is much less complicated than near the southern boundary. In southern British Columbia there is a distinct break between *ricei* and *scudderi* Edwards. In northwestern Washington and southwestern British Columbia the underwings of *ricei* often have some heavy markings. From Lake Chelan, Washington to the Hope Mts. of British Columbia and from the Olympic Mts. of Washington to Vancouver Island, the populations of *ricei* have a varying percentage of specimens with scattered and irregular black markings (fig. 1, nos. 19-22). However the pale chalky underside is retained in all of the males and most of the females. The populations of *scudderi* have an underside ground color that is characteristically light brown (fig. 1, nos. 1, 2). The distinction between the two is definite.

Nabokov (1949) was not sure of where the Vancouver Island, British Columbia populations should be placed. They seem to represent the most northern extension of *ricei*. These specimens all have the chalk white underwing of the typical *ricei*. Each specimen has a strong pattern of dots on the underside of the wing but those dots are irregular and diffused (fig. 1, nos. 20, 21). The dot pattern of *scudderi* is not irregularly distributed and the black dots are definite spots (fig. 1, nos. 1, 2). Blackmore (1927) and Jones (1951) have confused Vancouver Island *argyrognomon* with *melissa*. This mistake should be noted and corrected in any future paper on British Columbia Lepidoptera. In addition, the southern British Columbia populations of *argyrognomon* have been constantly referred to as *anna* (Blackmore, 1927, Jones, 1951). This is due to the heavy marking found on the underwings. However the pattern of these markings is very different from *anna* (fig. 1, nos. 14, 20, 21).

Lycaeides argyrognomon scudderi (Edwards) *Lycaena scudderii* Edwards, 1861, Proc. Acad. Nat. Phil., p. 164.

As mentioned above, the separation of *ricei* and *scudderi*



is distinct. However, separation of *scudderi* and *melissa* in southern British Columbia is not as simple. Both forms have a definite pattern of black dots on the underside of the wing. Only an examination of the male genitalia will assure adequate separation. The genitalia from specimens of the Okanogan Lake region are always distinctly *scudderi* or *melissa* even though the populations of the two species may be found within a few miles of each other. This is in contrast to the Wyoming area where the genitalia of some specimens are intermittent (Nabokov, 1949). This would suggest that the two species are not interbreeding in the Okanogan area of British Columbia.

The subspecies *scudderi* occupies all of southern continental British Columbia except for the Hope Mountains, the narrow sagebrush-filled valleys, and the extreme southeast corner of the province (Table 1). The Hope Mountains are populated by *L. a. ricei*, the sagebrush by *L. melissa*, and the southeast by *L. a. ferniensis* Chermock.

Nabokov (1949) credited British Columbia with the subspecies *ferniensis* from Ferney and Cranbrook B. C. No specimens were examined from either of these specific localities. However a specimen from Kaslo, just north of Cranbrook, is definitely *scudderi*. Again, as with the *anna-ricei* problem, many more specimens need be collected from the area. Is *ferniensis*

Fig. 1. *Lycaeides argyronomon scudderi*, 1, 2,.; *melissa*, 3, 6, 9; *atraepraetextus*, 4, 5, 7, 8; *ricei*, 10-13, 15-24; *anna*. 14. 1. Salmon arm B.C. 2. Lytton B.C. 3. Oak Creek, Wash. 4. Cornez Creek, Ore. 5. Lake Wallowa, Ore. 6. Pearygin Lake, Wash. 7. & 8. Oregon Butte, Wash. 9. Kennewick, Wash. 10. Paulina Lake, Ore. 11. Gilchrist, Ore. 12. Blue Slide Lookout, Wash. 13. Lakeview, Ore. 14. Wolverton Mdws., Calif. 15. Tombstone Prairie, Ore. 16. Mt. Rainier, Wash. 17. Crater Lake, Ore. 18. Sheep Lake, Wash. 19. Bunker Hill Lookout, Wash. 20. & 21. Mount Malahat, B.C. 22. Bunker Hill Lookout, Wash. 23. Bradley Creek, Ore. 24. Mt. Cheam, B.C.

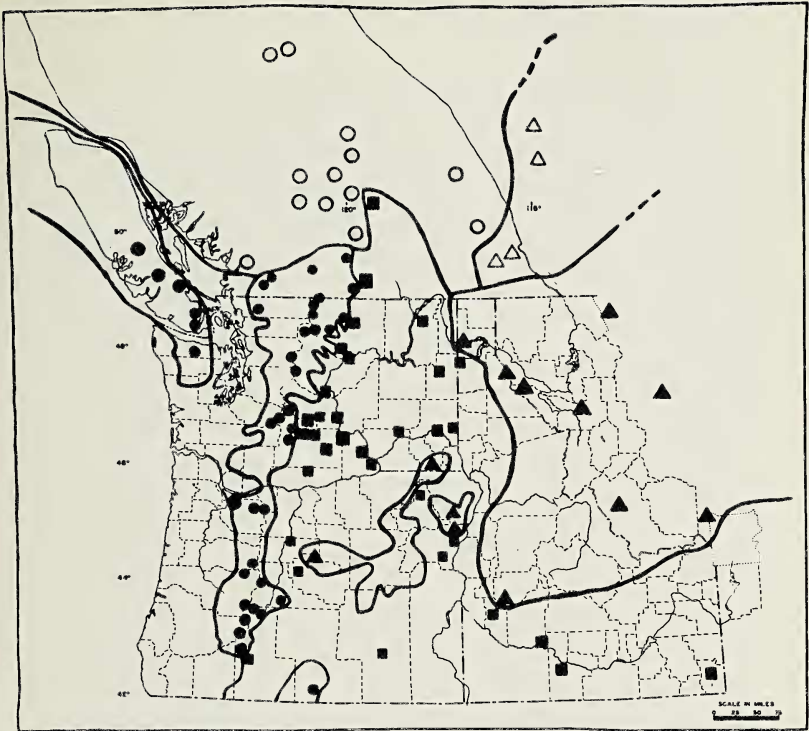
a local form or something of wide enough distribution and distinct enough to deserve a subspecific name? Southeastern British Columbia is composed of many small mountain chains separated by deep valleys. There are many areas where local populations could be isolated and differentiated. Further collecting will be necessary to clarify the concepts of subspecies in this area.

Lycaeides argyrognomon atrapraetextus (Field) *Plebejus atrapraetextus* Field, 1939, Jour. Kansas Ent. Soc., 12:135-136.

This subspecies is found in the Rocky Mountains of Idaho and Montana and in the mountainous areas of eastern Oregon and southeastern Washington (Table 1). This subspecies bears an artificial resemblance to *melissa* because of the heavily marked underwing and the brown color of the underside of the wing. The two forms can be adequately separated only by an examination of the genitalia. The subspecies *atrapraetextus* closely resembles its northern relative *scudderi*. The two are separated by a character on the underside of the hind wing. There is a band of light, almost white, chevrons basal to the outer band of orange markings (fig. 1, nos. 7, 8) in *atrapraetextus*. *Scudderi* has this band reduced to a series of light chevrons, resembling check marks (fig. 1, nos. 1, 2).

When Nabokov (1949) discussed the distribution of this subspecies, he limited it to the mountains of northern Idaho and western Montana. Nabokov had one isolated specimen of *argyrognomon* from near Boise, Idaho which he could not place as to subspecies because he lacked any other specimens from near this locality. The specimens from eastern Oregon and Washington are not sufficiently different from the Idaho and Montana forms to be separated as a subspecies. Thus a connecting link is supplied between Boise and northern Idaho. The author suggests that the name *atrapraetextus* be used to apply to *argyrognomon* from all of Idaho, western Montana, eastern Oregon and southeastern Washington.

A question might arise. Why is there no intergradation between populations of *atrapraetextus* from the Ochoco Mountains, Oregon and populations of *ricei* from just west in the Cascades? The Ochoco's seem to receive all their faunal elements from the Rockies. A narrow but permanent band of juniper separates the Cascades from the mountain ranges of eastern Oregon. This is also an effective barrier for such groups as *Speyeria* Scudder and *Euphydryas* Scudder.



- *Lycaeides argyrognomon ricei* Cross
- *Lycaeides argyrognomon scudleri* Edw.
- △ *Lycaeides argyrognomon ferniensis* Chermock
- ▲ *Lycaeides argyrognomon atraepraetextus* Field
- *Lycaeides melissa* Edw.

Figure 2. The Distribution of *Lycaeides* in the Pacific Northwest.

I would like to thank the following persons for providing me with access to their private or public collections: Dan Carney, E. J. Dornfeld (EJD), Clarence J. Duffy (CJD), M. T. James Washington State University) (WSU), J. D. Lattin (Oregon State University (OSU), David Mays, David McCorkle (DM), Miss Olga Meixner (Vancouver City Museum) (VCM), E. J. Newcomer (EJN), and G. G. E. Scudder (University of British Columbia (UBC).

TABLE 1. DISTRIBUTION RECORDS

L. a. ricei: Oregon-Clackamas Co.: Government Camp, Hwy. 26, July 2, 1934, S. Jewett Jr., 1 ♂, (OSU); Mt. Hood, July 2, 1934, 1 ♂, (OSU); East of Toll Gate, Hwy. 26, July 15, 1906, 2 ♂♂, (OSU). -Deschutes Co.: Paulina Lake, July 28, 1934, S. Jewett Jr., 2 ♂♂ and 2 ♀♀, (OSU). -Douglas Co.: Diamond Lake, July 14, 1937, 1 ♂ and Aug. 16, 1935, 1 ♂ and 1 ♀, H. A. Scullen, (OSU). -Klamath Co.: Bradley Cr., near Windigo Pass, July 25, 1934, S. Jewett Jr., 1 ♂ and 2 ♀♀, (OSU); Crater Lake Park, elev. 6000'-7100', Aug. 13 - Sept. 3, 1930, H. A. Scullen, 4 ♂♂♂ and 3 ♀♀♀, (OSU); Davis Lake, July 23, 1934, S. Jewett Jr., 1 ♂ and 2 ♀♀, (OSU); Gilchrist, Hwy. 97, July 28, 1962, E. J. Dornfeld, 1 ♂, (JHS). -Lake Co.: 6 mi. West of Lakeview, July 8, 1937, elev. 5100', Bollinger and Jewett, 1 ♂, (OSU). -Lane Co.: McKenzie Bridge, Hwy. 126, Aug. 25, 1906, 1 ♂, (OSU); Mule Prairie, Hwy. 58, elev. 4400', July 11, 1962, E. J. Dornfeld, 2 ♂♂, (JHS); Willamette Pass, elev. 5000', July 3, 1959, E. J. Dornfeld, 1 ♂, (JHS). -Linn Co.: Lost Prairie, Hwy. 20, elev. 3400', July 3, 1961, E. J. Dornfeld, 1 ♂, (JHS); Tombstone Prairie, Hwy. 20, elev. 4200', Aug. 4, 1960, E. J. Dornfeld, 1 ♂, (JHS). -Multnomah Co.: Grahams, 4 mi. East of Portland, July 15, 1906, 1 ♂, (OSU). -Washington-Chelan Co.: Crockers Cabin, near Bridge Creek, July 22, 1960, C. J. Duffy, 2 ♂♂ and 1 ♀, (CJD); Twisp Pass, elev. 6066', July 18, 1960, C. J. Duffy, 2 ♂♂, (CJD). -Clallam Co.: Olympic Mts., 1 ♂, (WSU). -King Co.: Stephens Pass, Aug. 9, 1961, D. McCorkle, 2 ♂♂ and 1 ♀, (DM). -Okanogan Co.: Bunker Hill Lookout, elev. 6950', July 19 - Aug. 14, 1961, J. Shepard, 11 males and 12 females, (JHS); Camp Gilbert, (NAB); Cooney L. Trail, (BVL) (Nab); Foggy Dew Creek, (Nab); Gold Creek, (Nab); Harts Pass, Aug. 1, 1959, D. McCorkle, 2 ♂♂, (DM); North Creek, July 39, 1960, C. J. Duffy, 1 ♂ and 1 ♀, (CJD); Pasayten Airport, elev. 4200', June 27, 1961, J. Shepard, 10 males and 6 females, (JHS); Salmon Mdw., Aug. 2, 1958, D. McCorkle, 1 ♂, (DM); Slate Peak, Aug. 13, 1961, D. McCorkle, 1 ♀, (DM); and Sept. 5, 1961, J. Pederson, 1 ♀, (JHS). -Pierce Co.: Mt. Rainier, (BVL) (Nab); Reflection Lakes, Mt. Rainier Nat. Park, July 20, 1960, J. Shepard, 3 ♂♂♂, (JHS); Tipsoo Lake, (BVL). -Snohomish Co.: Blue Lake, (BVL). -Whatcom Co.: Mt. Baker, (Nab) (BVL); Skyline Ridge, near Mt. Baker, (BVL); Table Mt., near Mt. Baker, (BVL). -Yakima Co.: Bethel Ridge, Aug. 11, 1958, E. J. Newcomer, (EJN); Blue Slide Lookout, elev. 6870', Aug. 6 and 7, 1959, J. Shepard, 2 ♂♂ and 1 ♀, (JHS); Chinook Pass (Sheep Lake Trail), D. McCorkle, Aug. 2, 1958, 1 ♂ and 1 ♀, Sept. 2, 1960, 1 ♂ and 1 ♀, Sept. 7, 1960, 1 ♂, (DM); Chinook Pass (Sheep Lake Trail), Sept. 6, 1962, J. Shepard, 8 males and 3 females, (JHS); Ravens Roost, near Cliffdell, Aug. 9, 1958, D. McCorkle, 1 ♂, (DM); Sheep Lake, July 25, 1958, E. J. Newcomer, (EJN). -British Columbia-Alberni Dist.: Mt. Corley, July 22, 1951, J. R. Jones, 1 ♀, (UBC). -Comox Dist.: Mt. Beecher, Forbidden Plateau, July 17, 1951, 1 ♂, (UBC). -Malahat Dist.: Gold Stream, July 9, 1923, J. F. Clarke, (WSU), July 1 and 3, 1921, E. Blackmore, 1 ♂ and 1 ♀, (UBC), July 3-5-8, 1918, E. Blackmore, 3 ♂♂♂, (UBC), June 27, 1898, E. Blackmore, 1 ♀, (UBC); Mt. Malahat, June 8 - Aug. 5, 1931 - 1951, J. R. Jones, 13 males and 6 females, (UBC); Shawnigan Lake, June 23, 1925, E. Blackmore, 1 ♂, (UBC). -Osoyoos Dist.: Okanogan Lake, (Nab); Peachland, (Nab). -Shaw-nigan Dist.: July 21, 1948, J. R. Jones, 1 ♂, (UBC). -Similkameen Dist.: Keremeos Creek, June 24, 1 ♂, (UBC). Victoria Dist.: Victoria, June, 1934, W. Downes, 1 ♂, (UBC). -Wellington Dist.: Wellington, July 3, 1902, E. Blackmore, 1 ♂, (UBC). -Yale Dist.: Coalmont, (Nab); Hope Mt., July 19, 1906, 2 ♂♂ and 1 ♀, (UBC); Mt. Cheam, Aug. 17, 1922, W. B. Anderson, 1 ♂, (UBC), July 24, 1915, R. C. Treherne, 1 ♂, (UBC), Sept. 13, 1924, 1 ♂, (VCM), Genitalia Examined: Washington; Pasayten Airport (1), Bunker Hill Lookout (1), Mt. Rainier (1). -Oregon; Lakeview (1). -British Columbia; Mt. Malahat (1).

L. melissa: British Columbia-Kamloops Dist.: Sicamous, (Nab). -Penticton Dist.: June 15, 1918, W. B. Anderson, 2 ♂♂, (UBC). -Similkameen Dist.: Vasseaux Lake, June 14, 1919 and June 25, 1920, W. B. Anderson, 1 ♂ and 1 ♀, June 13, 1919, R. C. Treherne, 1 ♂, (UBC); Okanogan Falls, (Nab). -Idaho-Ada Co.: Kuna, (Nab). -Beaver Lake Co.: Nounan, (Nab). -El-

mer Co.: Kings Hill, (Nab). -Kootenai Co.: Twin Lakes, (Nab). -Twin Falls Co.: Rock Creek, near Buhl, June 27, 1935, R. Miller, 1 ♂, (RM). -Oregon-Baker Co.: Durkee, July 24, 1941, J. Baker, 1 ♂, (EJD), Aug. 27, 1940, L. W. Motley, 2 ♂♂, (OSU); Eagle Creek, near Richland, July 11, 1960, J. Baker, 3 ♂♂♂, (EJD). -Crook Co.: Crooked River, June 23, 1906, 2 ♂♂, (OSU); 98 mi. East of Bend, Aug. 20, 1945, H. A. Scullen, 1 ♂, (OSU). -Harney Co.: Frenchglen, elev. 4200', July 24, 1935, 6 males and 1 female, (OSU), Aug. 6, 1960, E. J. Dornfeld, 2 ♀♀, (EJD), July 26, 1962, E. J. Dornfeld, 1 ♂, (EJD). -Jefferson Co.: Gateway, 1 ♂, (OSU). -Klamath Co.: Fort Klamath, (Nab). -Union Co.: Elgin, June 18, 1960, R. Miller, (RM). -Washington-Benton Co.: Kennewick, June 6 - Sept. 17, 1958 - 1960, J. Shepard, 5 ♂♂♂♂ and 2 ♀♀, (JHS); Richland, June 9, 1960, J. Shepard, 1 ♂, (JHS); Vernita, July 25, 1959, D. McCorkle, 1 ♂ and 1 ♀, (DM). -Chelan Co.: Wenatchee, (BVL). -Franklin Co.: Kahlotus Lake, May 14, 1960, J. Shepard, 1 ♂, (JHS). -Kittitas Co.: Ellensburg, (Nab); Nelson's Landing, (Nab); Vantage, May 14, 1960, D. McCorkle, 2 ♂♂, (DM). -Klickitat Co.: Satus Pass, June 15, 1960, D. McCorkle, 2 ♂♂, (DM). -Okanogan Co.: Black Canyon, (BVL); Brewster, (Nab); Fish Lake, near Conconully, Sept. 14, 1960, D. McCorkle, 1 ♂, (DM); Pearygin Lake, June 17, 1961, J. Shepard, 2 ♂♂ and 1 ♀, (JHS); South Creek, July 9, 1960, C. J. Duffy, 1 ♂, (CJD); Winthrop, July 9, 1960, C. J. Duffy, 2 ♀♀, (CJD), and June 17, 1961, J. Shepard, 1 ♂, (JHS). -Pend Oreille Co.: Ruby, (BVL). -Spokane, (BVL). -Whitman Co.: Almota, July, (WSU); Pullman, (BVL). -Yakima Co.: Bear Canyon Road, Hwy. 5, July 5, 1962, D. McCorkle 1 ♂, (DM); Cottonwood Creek, elev. 2000', June 15, 1959, E. J. Newcomer, 1 ♂ and 1 ♀, (EJN); Oak Creek, elev. 2000', June 7, 1961, J. Shepard, 3 ♂♂♂, (JHS); Priest Rapids, elev. 500', June 2, 1959, E. J. Newcomer, 1 ♂, (EJN); Tieton, (BVL); Wenas Creek, elev. 2500', May 20, 1959, E. J. Newcomer, 1 ♂, (EJN); Yakima, July 26, 1922, W. Downes, 1 ♂ and 1 ♀, (UBC); Zillah, Aug. 23, 1958, D. McCorkle, 6 males and 2 females, (DM). Genitalia Examined: Washington; Kennewick (1), Oak Creek (1), Pearygin Lake (1). -Oregon; Durkee (1), Frenchglen (3), Crooked River (1), Gateway (1). -British Columbia; Pentiction Dist. (2), Vasseaux Lake (1).

L. a. atraprae-extus: Oregon-Baker Co.: Cornucopia, elev. 7100', July 25, 1936, R. E. Rieder, 1 ♂, (OSU). -Crook Co.: Cornez Creek, Aug. 15, 1959, E. J. Dornfeld, 2 ♂♂ and 2 ♀♀, (JHS); Marks Creek Lodge, July 20, 1958, E. J. Dornfeld, 2 ♂♂, (JHS); Viewpoint Road, July 23, 1960, E. J. Dornfeld, 2 ♂♂ and 3 ♀♀, (JHS). -Wallowa Co.: 2 miles South of Wallowa Lake, Sept. 1, 1962, D. Mays, 1 ♂ and 1 ♀, (JHS). -Washington-Columbia Co.: Oregon Butte, elev. 6400', July 20, 1958, R. Miller, 2 ♂♂ and 2 ♀♀, (JHS). -Idaho-Bonner Co.: Priest River, (Nab). -Shoshone Co.: Uranus Peak, (Nab). -Montana-Beaverhead Co.: Polaris, (Nab). -Cascade Co.: King's Hill, (Nab). -Gallatin Co.: Gallatin Valley, July 18, 1936, W. Downes, 1 ♂ and 1 ♀, (UBC). -Glacier Co.: Garden Wall, (Nab). -Jackson Co.: Elkhorn Road, (Nab). -Mineral Co.: De Borgia, elev. 3000', July 23, 1957, E. J. Newcomer, 1 ♀, (EJN). Genitalia Examined: Washington; Oregon Butte (1). -Oregon; Cornez Creek (1), Cornucopia (1), Lake Wallowa (1), Marks Creek (2). -Montana; De Borgia (1), Gallatin Valley (1).

L. a. scudderi: British Columbia-Cariboo Dist.: Cariboo, July 10, 1920, 1 ♂, (UBC); Quesnel, (Nab); Stanley, (Nab). -Kamloops Dist.: Armstrong, June 29 - July 10, 1914, W. Downes, 4 ♂♂♂♂ and 3 ♀♀♀, (UBC); Chase, Aug. 9, 1919, W. B. Anderson, 1 ♂ and 1 ♀, (UBC); Enderby, June 18 - Aug. 15, 1920 - 1922, J. Wynne, 4 ♀♀♀♀, (UBC); Hefferly Creek, (Nab); Nicolo Lake, June 17, 1922, W. R. Buckell, 1 ♀, (UBC); Salmon Arm, April 25 - June 17, 1914 - 1921, W. R. Buckell, 8 males and 1 female, (UBC); Vaneby, elev. 4500', Aug. 10, 1921, 1 ♀ and June 21, 1921, 1 ♀, T. A. Moillet, (UBC); Vernon, June 22 - Aug. 10, 1904 - 1919, 4 ♂♂♂♂ and 4 ♀♀♀♀, (UBC). -Kootenay Dist.: Carbonate, (Nab); Kaslo, 1897, 1 ♂, (UBC); Revelstoke Mt., Aug. 14, 1923, W. R. Buckell, 6 males and 2 females, (UBC). -Lillooet Dist.: Lillooet, July 10, 1922, K. F. Anderson, 1 ♂, (UBC); Jesmond, (Nab); Pavilion, July 18, 1933, W. Downes, 2 ♂♂ and 1 ♀, (UBC). -New Westminster Dist.: New Westminster, (Nab). -Osoyooos Dist.: Kelowna, (Nab). -Peace River Dist.: Rolla, (Nab). Genitalia Examined: British Columbia; Armstrong (2), Chase (1), Kaslo (1), Lytton (1), Revelstoke Mt. (1), Salmon Arm (1), Vernon (1).

Lycaeides melissa (Edwards)

Lycaena melissa Edwards, 1873, Trans. Amer. Ent. Soc., 4:346-348.

L. melissa is found in the Pacific Northwest only in the central Columbian Plateau, the Snake River drainage lowlands, and the Great Basin area of southern Oregon (Table 1). It can be confused with certain subspecies of *argyrognomon*. The distinctions have been discussed under those respective subspecies; *scudderi* and *atrabraetextus*.

The habitat is much more varied for *melissa* than for *argyrognomon*. On the east side of the Cascades it can be found in ponderosa forests. From there it invades the lowland sagebrush country only along streams where deciduous growth is supported. It is not found directly in the dry sagebrush. Also it is commonly found in the valleys of Oregon and Washington where irrigation and farming occur. Along the Snake River, Columbia River and in southern Oregon it is found near streams and irrigated regions. The species *melissa* can succeed in invading mountains only to the limit of continuous ponderosa pine distribution. Then the species *argyrognomon* is dominant.

Nabokov (1949) pointed out several places where *argyrognomon* and *melissa* were sympatric i.e. Brewster, Washington and Fort Klamath, Oregon. This sympatricity has never been found by the author or by any of the Pacific Northwest collectors with whom he has communicated. The Brewster records are not especially reliable for specimens that are normally mountain forms. Remington (1963) has recently brought attention to the labels of T. C. Hopfinger (of Brewster). The *ricei* specimens labeled Brewster could never have been taken exactly there. The same is probably true for the specimens from Fort Klamath. That is, they were not taken together but at close localities separated by wide ecological differences.

In Wyoming, where Nabokov (1949) has demonstrated the interbreeding of the two species, *argyrognomon* and *melissa*, it would appear that the two are able to occupy the same microhabitat and thus interbreed. In the Pacific Northwest, other than perhaps extreme southeastern Idaho, the two species have definite and separate ecological preferences.

The distribution of the genus *Lycaeides* in the Pacific Northwest is very similar to that of the bird genus *Zonotrichia* Rand (1948). Rand discussed the origin of this and several other bird genera in relation to the effect of the Wisconsin glacial period

on the isolation of species of birds to form subspecies. Rand proposed that at the glacial maximum there were four refugia where animal species were isolated. These areas were northwest Alaska, the Pacific coast, Rocky Mountains, and eastern United States. The various groupings of the subspecies of *argyrognomon* correspond well to these refugia. *L. ricei*, *anna*, and *lotis* Linter, found on the Pacific coast, are one group characterized by an underwing with a chalky white groundcolor. *Alaskensis* Chermock and *scudderi*, distributed from southeastern Alaska to southern British Columbia are another natural grouping. These two subspecies blend into each other and specimens from the intermittent area are not easily assigned to either subspecies. *Atrapraetextus* from the central Rockies and *aster* Edwards from eastern United States are the two other groupings corresponding to Rand's bird distribution. In addition there is a fifth group including *sublivens* Nabokov and *longinus* Nabokov. These are found in the Rocky Mountains south of Montana. There was an extensive glacial sheet covering northwestern Wyoming during the Wisconsin period (Kamp, 1963). This was likely the factor that separated *argyrognomon* to form *sublivens* and *longinus*.

Since *argyrognomon* formed subspecies as a result of glaciation during the Wisconsin, it and the species *melissa* must have been separated as species prior to this time.

SUMMARY

There are two species of *Lycaedis* in the Pacific Northwest, *argyrognomon* and *melissa*. *Argyrognomon* has formed three subspecies *ricei*, *scudderi*, and *atrapraetextus*. These subspecies probably resulted from a break-up of the species during the Wisconsin glacial period.

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